

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Suzuki et al.

Serial No.: 10/519,544

Art Unit: 1714

Filed : December 28, 2004

Examiner: Szekely, Peter

Title : POLYAMIDE RESIN COMPOSITION AND PROCESS FOR PRODUCING  
THE SAME

DECLARATION UNDER RULE 132

Honorable Commissioner of Patents and Trademarks,  
Alexandria, VA 22313-1450

Sir:

I, Noriyuki Suzuki, a citizen of Japan and having postal mailing address of 1-2-54, Koyodai, Kawanishi-shi, Hyogo 666-0115 JAPAN, declare and say that:

March, 1987, I was graduate from Department of Synthetic Chemistry, Faculty of Engineering Science, Osaka University;

Since April, 1998, I have been employed by Kaneka Corporation, and engaged in develop for new polymer materials in the field of engineering plastics such as polyallylate, polyamide, polycarbonate and polyester;

I am one of the inventors of the above-identified application and am familiar with the subject matter thereof;

I have read the Official Action mailed and the references cited therein;

I respectfully submit herewith my exact report thereon;

In order to demonstrate the unexpected effect in mold shrinkage rate of the composition due to the combination of specific polyamide and swelling mica, I have carried out the

following experiment:

<Experimental Examples, Comparative Experimental Examples and their Control Examples>

The following Experimental Examples, Comparative Experimental Examples and Control Examples were demonstrated in substantially the same ash content for the purpose of comparing the mold shrinkage rate of the compositions.

<Materials used in the Experimental Examples>

<Resins>

- Polyamide resin A1 (Nylon 6):  
Unitika Nylon 6 A1030BRL (product of Unitika Ltd.)
- Polyamide resin A2 (Nylon 66):  
Unitika Nylon 66 A125N (product of Unitika Ltd.)
- Polyamide resin A3 (Nylon 46):  
Stanyl TS300 (product of DSM-JSR)
- Polyamide resin A4 (Nylon MXD6):  
Reny 6002 (product of Asahi Kasei Corporation)
- Styrene resin B1: (ABS resin, the resin prepared by the method described as REFERENCE EXAMPLE 1 in the instant application)
- Polybutylene terephthalate (Mitsubishi Engineering-Plastic Corporation, NOVADURAN 5009L)

<Filler>

- Clay J-1 (the clay prepared in SYTHETIC EXAMPLE 1 as described in the instant application)
- Talc (product of Hayashi-Kasei Co., Ltd., MS-T)
- Mica (product of YAMAGUCHI MICA Co., Ltd., A-21)
- Kaolin (product of Hayashi-Kasei Co., Ltd., TRANSLINK)

<Condition of Experiments >

The resin and filler at the weight ratios set forth in the

below Tables 1 and 2 were melt-mixed using a twin screw extruder (TEX 44 produced by Japan Steel Works, Ltd.) while adjusting the temperature to the dies to 200°C to 260°C from the initial stage of the mixing. The mold shrinkage rate of the resulting polyamide resin compositions and polybutylene terephthalate composition were evaluated. The results are shown in Tables 1 and 2.

#### <Mold Shrinkage Rate>

Each resin composition was dried (90°C, 10 hours). A tabular specimen having dimensions of approximately 120 mm x 120 mm x 2 mm was formed by injection molding using an injection molding machine with a clamping pressure of 80 tons at a resin temperature in the range of 240°C to 300°C (Polyamide resin A1: 240°C, Polyamide resin A2: 260°C, Polyamide resin A3: 300°C, Polyamide resin A4: 280°C, Polybutylene terephthalate: 240°C), and the die temperature of 80°C.

The tabular specimen was still stood for 24 hours at a room temperature of 23°C and humidity of 50%, and then the mold shrinkage rate of the specimen was evaluated in the direction of MD (= the direction of the resin flow).

The mold shrinkage rate was determined by the following equation:

$$\text{Mold shrinkage rate (\%)} = [(\text{size of die}) - (\text{observed size of molded product})] / (\text{size of die}) \times 100$$

Table 1

	Unit	Experimental Example				
		1	2	3	4	5
Polyamide resin A1	Part(s) *	100				55
Polyamide resin A2	Part(s)		100			
Polyamide resin A3	Part(s)			100		
Polyamide resin A4	Part(s)				100	
Styrene resin B1	Part(s)					45
Polybutylene terephthalate	Part(s)					
Clay J-2	Part(s)	8.5	8.5	8.5	8.5	8.5
Talc	Part(s)					
Mica	Part(s)					
Kaolin	Part(s)					
Ash content	% by weight	6.3	6.2	6.2	6.3	6.2
Mold shrinkage rate	%	0.58	0.51	0.46	0.63	0.42

\*: "Part(s)" means "Part(s) by weight"

Table 2

	Unit	Comparative Experimental Example				Control Example	
		1	2	3	4	1	2
Polyamide resin A1	Part(s) *	100	100	100		100	
Polyamide resin A2	Part(s)						
Polyamide resin A3	Part(s)						
Polyamide resin A4	Part(s)						
Styrene resin B1	Part(s)						
Polybutylene terephthalate	Part(s)				100		100
Clay J-2	Part(s)				8.5		
Talc	Part(s)	7.2					
Mica	Part(s)		7.2				
Kaolin	Part(s)			7.2			
Ash content	% by weight	6.6	6.4	6.0	6.3	0.0	0
Mold shrinkage rate	%	1.67	1.60	1.78	1.32	1.86	1.98

\*: "Part(s)" means "Part(s) by weight"

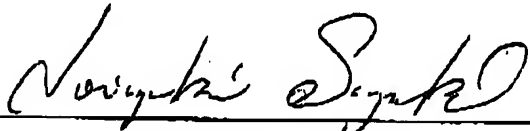
The results in the above tables show that incorporation of Clay J-2, which is one of the swelling mica recited in Claim 1, into a composition containing polyamide resin A1 contributes well to reduce mold shrinkage rate (1.86 - 0.58%), compared with a case for the polybutylene terephthalate composition (1.98 - 1.32%). Furthermore, incorporation of Clay J-2 were similarly effective for the compositions containing other types of

polyamide resin A2, A3 and A4.

Thus, the polyamide resin composition comprising a specific polyamide resin and a swelling mica produces unexpected effect in reduction of mold shrinkage rate.

I declare further that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed this 27<sup>th</sup> day of March, 2007

  
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Noriyuki Suzuki